18/12

Code No.: MA302HS | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) - December- 2024
PROBABILITY AND STATISTICS
(AI&DS)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) Define conditional probability and independent events. [2M]
   b) Is the function $f(x) = e^{-x}$, $x \geq 0$ and $f(x) = 0$, $x < 0$ a density function, find $P(X>0)$. [2M]
   c) In 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails. [2M]
   d) Define Poisson distribution. [2M]
   e) Define Gamma distribution. [2M]
   f) Define exponential function. [2M]
   g) Write the normal equations to fit the second-degree parabola $y = a + bx+cx^2$ [2M]
   h) The two regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.50x$. Find the correlation coefficient between x and y. [2M]
   i) A hypothesis is rejected at 5% level of significance. Is it accepted at 1% level of significance? Explain. [2M]
   j) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased. [2M]

PART-B **(50 Marks)**

2. There are three bags: first containing 1 white, 2 red, 3 green balls; second 2 white, 3 red, 1 green balls and third 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. These are found to be one white and one red. Find the probability that the balls so drawn came from the second bag. [10M]

OR

3. A die is tossed twice X(a,b) = Max(a,b). Find the mean and variance of the distribution. [10M]

4. The probability of a man hitting a target is 1/4: [10M]
   i) If he fires 7 times what is the probability of his hitting the target at least twice?
   ii) How many times must he fire so that the probability of his hitting the target at least once.

OR

5. Fit a Poisson distribution to the following: [10M]

x	0	1	2	3	4
f	122	60	15	2	1

6. X is normally distributed and the mean of X is 12 and S.D. is 4. Find the probabilities that (i) $X \geq 20$, (ii) $X \leq 20$ and (iii) $0 \leq X \leq 12$. [10M]

OR

7. Let X be a continuous random variable with p,d.f [10M]

$$f(x) = \begin{cases} kx, & 0 \leq x < 2 \\ 2k, & 2 \leq x < 4 \\ -kx + 6k, & 4 \leq x < 6 \\ 0, & elsewhere \end{cases}$$

Determine the constant k and mean value of X.

8. Fit the curve of the form y = a + bx + cx2 to the following data [10M]

x	1	1.5	2	2.5	3	3.5	4
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

OR

9. Find the correlation coefficient between x and y from the given data: [10M]

x	21	23	30	54	57	58	72	78	87	90
y	60	71	72	83	110	84	100	92	113	135

10. Two industries A and B manufacture textile machines. In a sample of 300 workers from the industry A, it was found that average weekly salary is Rs.1500 with standard deviation Rs.500. From a sample of 325 workers from the industry B, it was found that average weekly salary is Rs.1550 with standard deviation Rs.510. Are the average weekly wages in industry B higher than the average weekly wages in industry A? Test at 5% level of significance. [10M]

OR

11. A random sample of 10 boys had the following I.Q.: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100. Do these data support the assumption of a population mean I.Q. of 100? Test at 5% level of significance. [10M]

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